

Aula 6 (04/11/2022)

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transformada de Hough para círculos

Detecção de círculos nas moedas

```
In [ ]: import cv2
import numpy as np
import matplotlib.pyplot as plt

# Aplicar filtro de mediana e detecção de bordas de Canny
img_coins = cv2.medianBlur(img_coins,5)
img_coins = cv2.Canny(img_coins,100,200)

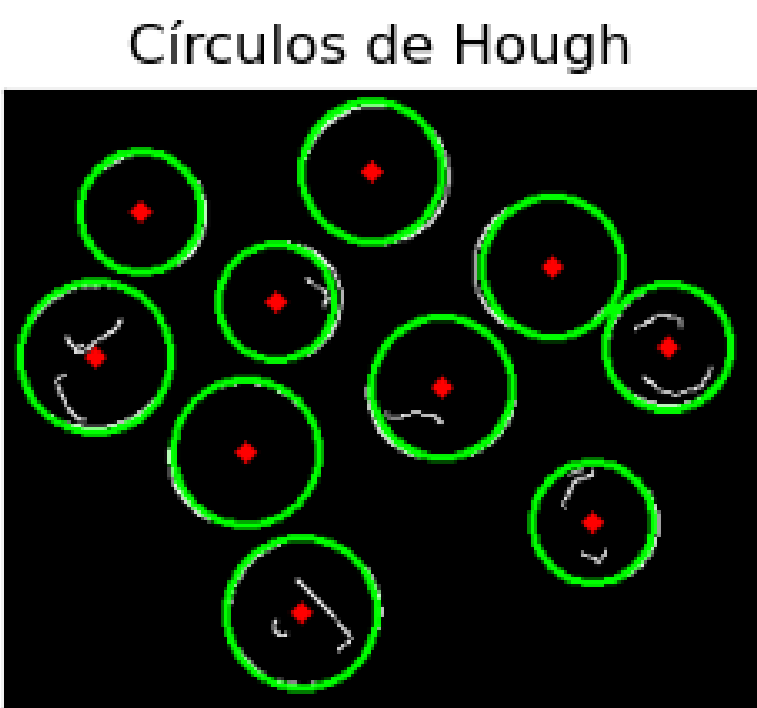
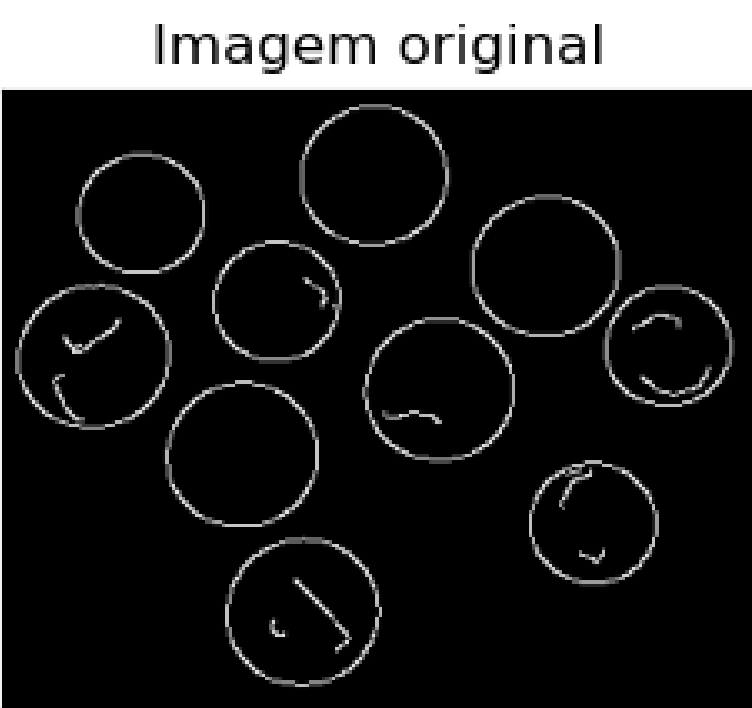
cimg = cv2.cvtColor(img_coins,cv2.COLOR_GRAY2BGR)

# Criar círculos de Hough
circles = cv2.HoughCircles(img_coins,cv2.HOUGH_GRADIENT,1,20,
                           param1=50,param2=30,minRadius=0,maxRadius=0)
circles = np.uint16(np.around(circles))

for i in circles[0,:]:
    # desenhar círculo de fora
    cv2.circle(cimg,(i[0],i[1]),i[2],(0,255,0),2)
    # desenhar círculo central
    cv2.circle(cimg,(i[0],i[1]),2,(0,0,255),3)

# Plotar todos os resultados
titles = ['Imagem original', 'Círculos de Hough']
images = [img_coins, cimg]
for i in range(2):
    images[i] = cv2.cvtColor(images[i], cv2.COLOR_BGR2RGB)
    plt.subplot(1,2,i+1),plt.imshow(images[i])
    plt.title(titles[i])
    plt.xticks([],plt.yticks([]))

txt = "Nº de círculos: {circulos}".format(circulos = circles.shape[1])
plt.text(5, img_coins.shape[1], txt, fontsize = 22, bbox = dict(facecolor = 'white', alpha = 0.5))
plt.show()
```



Nº de círculos: 10

Detecção de círculos em circles.png

```
In [ ]: img_circles = cv2.imread('images\circles.png', 0)

# Aplicar filtro de mediana e detecção de bordas de Canny
img_circles = cv2.medianBlur(img_circles,3)
kernel = np.ones((5,5),np.uint8)
img_circles = cv2.erode(img_circles,kernel,iterations = 1)
img_circles = cv2.Canny(img_circles,100,200)

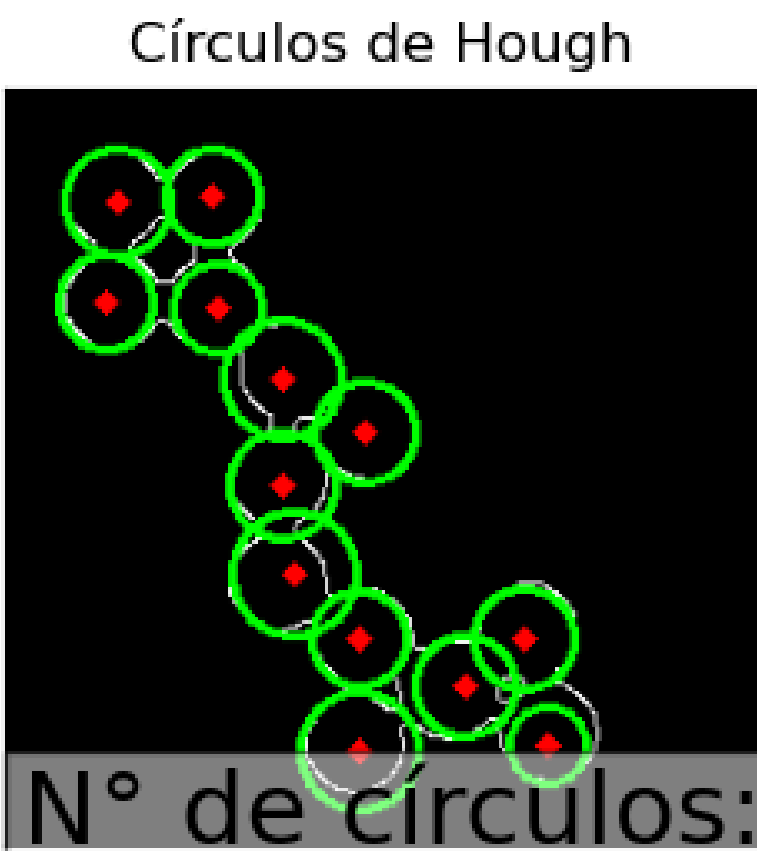
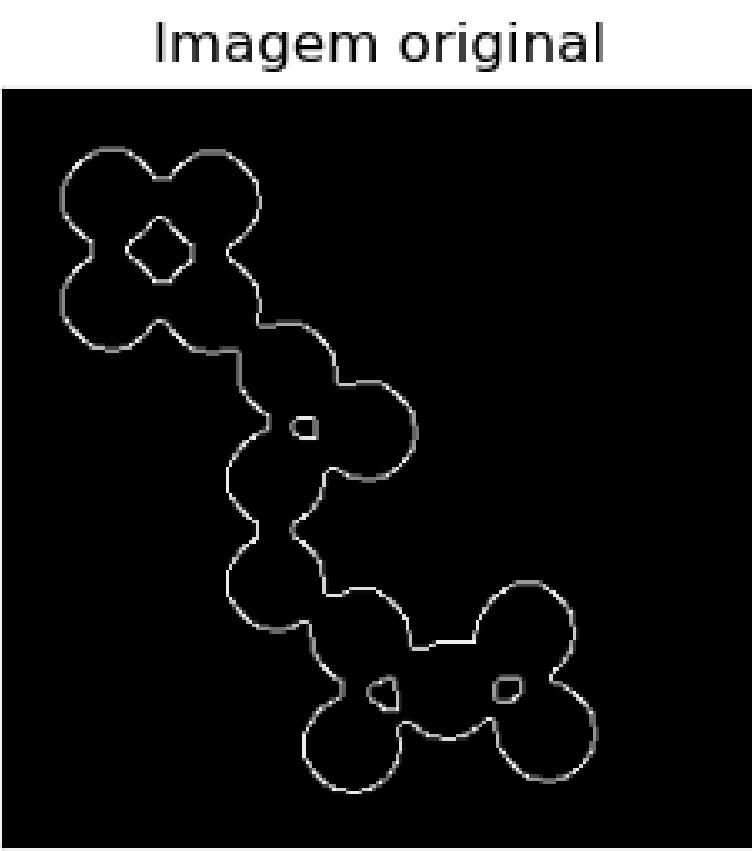
cimg = cv2.cvtColor(img_circles,cv2.COLOR_GRAY2BGR)

# Criar círculos de Hough
circles = cv2.HoughCircles(img_circles,cv2.HOUGH_GRADIENT,1,26,
                           param1=10,param2=20,minRadius=0,maxRadius=83)
circles = np.uint16(np.around(circles))

for i in circles[0,:]:
    # desenhar círculo de fora
    cv2.circle(cimg,(i[0],i[1]),i[2],(0,255,0),2)
    # desenhar círculo central
    cv2.circle(cimg,(i[0],i[1]),2,(0,0,255),3)

# Plotar todos os resultados
titles = ['Imagem original', 'Círculos de Hough']
images = [img_circles, cimg]
for i in range(2):
    images[i] = cv2.cvtColor(images[i], cv2.COLOR_BGR2RGB)
    plt.subplot(1,2,i+1),plt.imshow(images[i])
    plt.title(titles[i])
    plt.xticks([],plt.yticks([]))

txt = "Nº de círculos: {circulos}".format(circulos = circles.shape[1])
plt.text(5, img_circles.shape[1], txt, fontsize = 22, bbox = dict(facecolor = 'white', alpha = 0.5))
plt.show()
```



Nº de círculos: 13